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CLAIMS

	What is claimed is:
1 /	A method of establishing a secure wireless communications channel between an
2	access point and a station, the channel being encrypted with a channel key, the method
3	comprising:
4	sending, by the station to the access point, a request for a security preference for
5	the access point;
6	sending, by the access point to the station, the security preference in response to
7	the request when the access point can support the channel;
8	generating, by the station, authentication information using a first key when the
9	security preference is shared key;
10	sending, by the station to the access point, the authentication information;
11	validating, by the access point, the station using the authentication information;
12	encrypting, by the access point, the channel key using a second key when the
13	station is validated;
14	sending, by the access point to the station, the encrypted channel key;
15	decrypting, by the station, the channel key in response to receiving the encrypted
16	channel key; and
17	sending, by the station to the access point, data encrypted with the channel key to

establish the channel.

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- 1 2. The method of claim 1, wherein the first and second keys are a self-distributed
- 2 key.
- 1 3. The method of claim 2, further comprising:
- 2 generating, by the access point, the self-distributed key using a security algorithm
- 3 when the security preference is shared key;
- 4 generating, by the station and sending to the access point, a first value using the
- 5 security algorithm in response to receiving the security preference of shared key;
- 6 generating, by the access point, and sending to the station, a second value using
- 7 the security algorithm and the first value in response to receiving the first value; and
- 8 calculating, by the station, the self-distributed key using the security algorithm and
- 9 the second value in response to receiving the second value.
- 1 4. The method of claim 3, wherein the security algorithm is $g^n \mod p$ and further
- 2 comprising:
- obtaining, by the access point, integers x, g and p to generate the self-distributed
- $4 \quad \text{key } k = g^x \bmod p;$
- obtaining, by the station, the integers g and p, and an integer y to generate the first
- 6 value $Y = g^y \mod p$;
- 7 generating, by the access point, the second value $X = Y^x \mod p$; and
- 8 setting, by the station, z equal to y^{-1} to calculate the self-distributed key
- 9 $k = X^z \mod p$.

- 1 5. The method of claim 4 wherein obtaining, by the station, the integers g and p
- 2 comprises:
- sending, by the access point to the station, the integers for g and p.
- 1 6. The method of claim 5, wherein the integers for g and p are sent to the station
- when the security preferences are sent by the access point.
- 1 7. The method of claim 5, wherein the integers for g and p are sent to the station
- 2 when a user name and password for the station are registered with the access point.
- 1 8. The method of claim 4 further comprising:
- 2 publishing, by the access point, the integers g and p for a set of stations.
- 1 9. The method of claim 2 further comprising:
- encrypting, by the station, a name and password with the first key to generate the
- 3 authentication information; and
- 4 decrypting, by the access point, the name and password to validate the station.
- 1 10. The method of claim 2 further comprising:
- 2 sending, by the access point to the station, a challenge;
- 3 encrypting, by the station, the challenge with the first key to generate the
- 4 authentication information;
- 5 encrypting, by the access point, the challenge with the first key; and

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- 6 comparing, by the access point, the authentication information with the challenge
- 7 encrypted by the access point with the first key to validate the station.
- 1 11. The method of claim 1, wherein the first key is a public key of a public-private
- 2 key pair for the access point, and the second key is a public key of a public-private key
- 3 pair for the station.
- 1 12. The method of claim 11 further comprising:
- sending, by the access point to the station, the first key; and.
- sending, by the station to the access point, the second key.
- 1 13. The method of claim 12, wherein the second key is sent to the access point when
- 2 the request for the security preference is sent by the station.
- 1 14. The method of claim 12, wherein the first key is sent to the station when the
- 2 security preference is sent by the access point.
- 1 15. The method of claim 1, wherein establishing the channel creates a standard wired
- 2 equivalent privacy (WEP) network, and the station and the access point exchange
- 3 messages conforming to a format required by the standard that defines a WEP network to
- 4 establish the WEP network.
- 1 46. A method for connecting a station to a secure wireless network comprising:

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	3	wirele	ss network;			
	4		generating authentication information for the station when the station receives a			
	5	securi	ty preference specifying shared key from the access point;			
	6		sending the authentication information to the access point;			
	7		decrypting a channel key in response to receiving an encrypted channel key from			
	8	the access point; and				
	9		sending data encrypted with the channel key to the access point.			
	1	17.	The method of claim 16 further comprising:			
	1		generating a first value using a security algorithm in response to receiving the			
u D M	2	securi	ty preference specifying shared key from the access point;			
	3		calculating a self-distributed key using the security algorithm and a second value			
	4	in resp	oonse to receiving the second value from the access point; and			
	5		using the self-distributed key to generate the authentication information and to			
	6	decryp	ot the encrypted channel key.			
	1	18.	The method of claim 17, wherein the security algorithm is formulated as $g^n \mod p$			
	2	and fu	rther comprising:			

sending a request for a security preference to an access point for the secure

1 19. The method of claim 16 further comprising:

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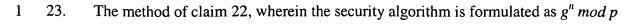
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obtaining integers for y, g and p to generate the first value $Y = g^y \mod p$; and

setting z equal to y^{-1} to calculate the self-distributed key $k = X^z \mod p$.

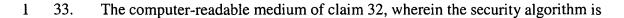
- using a first key to generate the authentication information; and
 using a second key to decrypt the encrypted channel key.
- 1 20. The method of claim 19, wherein the first key is a public key of a public-private
- 2 key pair for the access point, and the second key is a private key of a public-private key
- 3 pair for the station.
- 1 21. A method of securing a wireless network at an access point comprising:
 2 sending a security preference in response to a request from a station;
- 3 validating the station in response to receiving authentication information from the
- 4 station;
- 5 encrypting a channel key when the station is validated;
- 6 sending the encrypted channel key to the station; and
- sending data encrypted with the channel key to the station.
- 1 22. The method of claim 21 further comprising:
- 2 generating a self-distributed key using a security algorithm when the security
- 3 preference is shared key;
- 4 generating a second value using the security algorithm and a first value in
- 5 response to receiving the first value from the station; and
- 6 sending the second value to the station.



- 2 and further comprising:
- obtaining integers x, g and p to generate the self-distributed key $k = g^x \mod p$; and
- 4 generating the second value $X = Y^x \mod p$.
- 1 24. The method of claim 21 further comprising:
- 1 using a first key to evaluate the authentication information; and
- 2 using a second key to encrypt the encrypted channel key.
- 1 25. The method of claim 24, wherein the first key is a private key of a public-private
- 2 key pair for the access point, and the second key is a public key of a public-private key
- 3 pair for the station.
- 1 26. A computer-readable medium having stored thereon executable instructions to
- 2 cause a processor to perform a station method to connect to a secure wireless network, the
- 3 instructions comprising:
- 4 sending a request for a security preference to an access point for the secure
- 5 wireless network;
- 6 generating authentication information for the station when the station receives a
- 7 security preference specifying shared key from the access point;
- 8 sending the authentication information to the access point;
- 9 decrypting a channel key in response to receiving an encrypted channel key from
- 10 the access point; and

- sending data encrypted with the channel key to the access point.
- 1 27. The computer-readable medium of claim 26 having further instructions
- 2 comprising:
- generating a first value using a security algorithm in response to receiving the
- 2 security preference specifying shared key from the access point;
- 3 calculating a self-distributed key using the security algorithm and a second value
- 4 in response to receiving the second value from the access point; and
- 5 using the self-distributed key to generate the authentication information and to
- 6 decrypt the encrypted channel key.
- 1 28. The computer-readable medium of claim 27, wherein the security algorithm is
- 2 formulated as $g^n \mod p$ and having further instructions comprising:
- obtaining integers y, g and p to generate the first value $Y = g^y \mod p$; and
- setting z equal to y^{-1} to calculate the self-distributed key $k = X^z \mod p$.
- 1 29. The computer-readable medium of claim 26 having further instructions
- 2 comprising:
- 3 using a first key to generate the authentication information; and
- 4 using a second key to decrypt the encrypted channel key.

- 1 30. The computer-readable medium of claim 29, wherein the first key is a public key
- of a public-private key pair for the access point, and the second key is a private key of a
- 3 public-private key pair for the station.
- 1 21. A computer-readable medium having stored thereon executable instruction to
- 2 cause a processor to perform an access point method to secure a wireless network, the
- 3 instructions comprising:
- 4 sending a security preference in response to a request from a station;
- 5 validating the station in response to receiving authentication information from the
- 6 station;
- 7 encrypting a channel key when the station is validated;
- 8 sending the encrypted channel key to the station; and
- 9 sending data encrypted with the channel key to the station.
- 1 32. The computer-readable medium of claim 31 having further instructions
- 2 comprising:
- generating a self-distributed key using a security algorithm when the security
- 4 preference is shared key;
- 5 generating a second value using the security algorithm and a first value in
- 6 response to receiving the first value from the station; and
- 7 sending the second value to the station.



- 2 formulated as $g^n \mod p$ and having further instructions comprising:
- obtaining integers x, g and p to generate the self-distributed key $k = g^x \mod p$; and
- 2 generating the second value $X = Y^x \mod p$.
- 1 34. The computer-readable medium of claim 31 having further instructions
- 2 comprising:
- 1 using a first key to evaluate the authentication information; and
- 2 using a second key to encrypt the encrypted channel key.
- 1 35. The computer-readable medium of claim 34, wherein the first key is a private key
- 2 of a public-private key pair for the access point, and the second key is a public key of a
- 3 public-private key pair for the station.
- 1 36. A secure wireless network comprising:
- 2 an access point operable for receiving a connection request from a station through
- 3 a setup connection, for validating authentication information sent by the station, and for
- 4 connecting the station to the network through a channel secured with a shared channel
- 5 key; and
- a station operable for sending the connection request to the access point, and for
- 7 generating the authentication information to send to the access point.

- 1 37. The secure wireless network of claim 36, wherein the access point is further
- 2 operable for sending a security preference specifying shared key to the station upon
- 3 receiving the connection request, and the station is operable for sending the authentication
- 4 information to the station upon receiving a security preference specifying shared key.
- 1 38. The secure wireless network of claim 37, wherein the access point is further
- 2 operable for encrypting the shared channel key using a self-distributed key for sending to
- 3 the station and the station is further operable for decrypting the shared channel key upon
- 4 receipt.
- 1 39. The secure wireless network of claim 38, wherein the station and the access point
- 2 are further operable for calculating the self-distributed key by exchanging messages in
- 3 accordance with the Hughes transmission protocol
- 1 40. The secure wireless network of claim 36, wherein the station is further operable
- 2 for using a first key to generate the authentication information and for using a second key
- 3 to decrypt an encrypted shared channel key received from the access point, and the access
- 4 point is further operable for using a third key to evaluate the authentication information
- 5 and for using a fourth key to encrypt the shared channel key for sending to the station.
- 1 41. The secure wireless network of claim 40, wherein the first and third keys are
- 2 public and private keys, respectively, for the access point, and the second and fourth keys
- 3 are private and public keys, respectively, for the station.

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1	A2. A computer-readable medium having stored thereon a message data structure for a
2	secure wireless network comprising:
3	a station address field containing data representing an identifier for a station that
4	exchanges messages with an access point on the secure wireless network;
5	a transaction sequence number field containing data representing a sequence
6	number for a message exchanged between the station identified by the station address
7	field and the access point;
8	an authentication algorithm field containing data representing an identifier for a
9	protocol used by the access point to validate the station identified by the station address
10	field based on a name and password for the station; and
11	a dependent information field containing data required to connect the station
12	identified by the station address field to the secure wireless network.
1	43. The computer-readable medium of claim 42, wherein the data in the dependent
2	information field represents key information for encrypting the name and password for
3	the station identified by the station address field.

- The computer-readable medium of claim 42, wherein the data in the dependent 1 44.
- 2 information field represents an encrypted name and password for the station identified by
- 3 the station address field.

- 1 45. The computer-readable medium of claim 42, wherein the data in the dependent
- 2 information field represents an encrypted channel key used to connect the station
- 3 identified by the station address field to the secure wireless network.